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Dyslexia screening and diagnostic procedures and their implications for the EFL context in Poland

Abstract

The present study investigates the reliability of IQ-achievement discrepancy tests in diagnosing dyslexia in speakers of two languages. Two groups of twelve-year-old Polish dyslexic (N = 20) and non-dyslexic (N = 20) EFL learners were tested in reference to three factors: reading comprehension in Polish and English, reading rate in both languages, and reading accuracy in English. The results of an a posteriori testing revealed that 25 per cent of students holding an official dyslexia certificate were either no dyslexic or represented cognitive deficits other than dyslexia. The same per cent of 25 of students classified as regular achievers met the cognitive profile of those with dyslexia. These findings might shed new light on the reliability and validity of the traditional LD diagnostic procedure in speakers of a transparent L1 and an opaque L2.

Keywords: IQ-achievement discrepancy, dyslexia, screening, diagnosis, EFL

Introduction

Dyslexia is a lifelong learning condition that affects one's life in both public and social domains. Therefore, early and accurate identification of this LD is crucial for success in various fields of life. The importance of research on dyslexia has been best expressed in the Research Excellence and Advancements for Dyslexia Act passed by the Senate of the United States (H.R. 3033, 2016). It reads that "the National Science Foundation shall support multi-directorate, merit-reviewed, and competitively awarded research on the science of specific learning disability, including dyslexia, such as research on the early identification of children and students with dyslexia, professional development for teachers and administrators". It is to be noticed that the Polish research on dyslexia is not prioritized to this extent. Government laws and regulations do not address research in reading and writing as clearly and distinctly as the American READ act. There are needs and concerns raised by teachers, parents and schools but they are not met in research agendas.

The only ministerial document that makes reference to SEN students is the Ordinance of the Minister of Education of 9 August 2017 on organizing educational support for SEN students. It makes statements on the needs of SEN students and

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sets conceptual frames for educational support available at a school level. As a consequence of the lack of research grounding, this support resembles a set of intuitive interventions that teachers and schools make to meet these regulations. Thus, the research on reliable dyslexia screening and diagnostic procedures that allow for an early identification of reading and writing problems in cross-linguistic and cross-cultural contexts is seen as a stepping stone to further educational actions to be taken in Poland.

Statistical data on the prevalence of dyslexia in various school settings point to an increasing number of students with this condition. The report by the Polish National Examination Board (Centralna Komisja Egzaminacyjna, 2016) points to the steady growth in the number of dyslexic students who take competence tests at the end of primary education (end of KS2). In the same vein, the Statistics Netherlands' Health Survey (2016) reveals that the number of dyslexic students aged 7 to 11-year-olds increased from 6 per cent in the period 2001–2008 to 8 per cent in the period 2009-2015. Similarly, the report on special educational needs in England (Department for Education National Statistics, 2017, p. 10) records an increase in the number of SLD students. Interestingly, the report states that

> the most common primary type of need for pupils with SEN support for whose first language is known to or believed to be other than English is Profound and Multiple Learning Difficulties (30.4%). The least common primary type of need for the same group of pupils is Specific Learning Difficulty (8.9%).

The same report points to discrepancies in the number of students identified as having language problems for whom English is their L1 and L2. In the group of speakers of English of L1, as much as 11.7 per cent were reported to be on SEN support. Whereas in the group of speakers whose first language is known or believed to be other than English, only 10.2 percent of students were on SEN support. The increasing number of students with reading and writing difficulties has also been observed (Fidler & Everatt, 2012, p. 91) to enter higher education institutions in the UK. The number of first-year college students with dyslexia on entry was 10.430 in 2000/1; 21.000 in 2004/5 and 30.415 in 2008/9. The British Higher Education Statistics Agency's (HESA) reported that over a period of 12 years the number of students with dyslexia increased by 2.0 per cent that is from 0.4 per cent in 1995/96 to 2.8 per cent 2006/7 (in Meehan, 2010, p. 28).

Dyslexia screening procedures

Dyslexia screening procedures involve a) diagnosis b) intervention and c) documentation (International Dyslexia Association, 2009). The diagnosis translates to a collection of data on students' strengths and weaknesses to examine if the students' profile fits the definition of dyslexia. Intervention practices aim to draw from the data collected in the diagnostic stage in order to work out a remedial educational programme. Subsequently the documentation stage involves the documentation of students' learning history to opt for special educational services. It should be noticed that the stages are followed in an inconsistent order when

cross-country procedures are compared. The assessment procedure described above is promoted by the International Dyslexia Association and refers to an American specific approach to screening. The information that comes from the British Dyslexia Association (British Dyslexia Association, 2018, page not provided) points to the superior role of diagnosis understood as a tool " to confirm whether an individual has dyslexia or not. It provides a confirmed diagnosis of dyslexia, as well as a clearer picture of the young person's strengths and weaknesses and their individual cognitive profile". The procedural description states that the assessment report may be requested by a student/parent/school as evidence for examination arrangements or a better understanding of a student's cognitive profile. Therefore, evidence collection (documentation) proceeds the intervention stage.

Table 1. Dyslexia screening procedures in the USA, the UK and Poland

IDA	BDA	IBE
1. diagnosis	1. diagnosis	1. diagnosis
2. intervention	2. documentation	2. documentation
3. documentation	3. intervention	3. ----------

* IDA (International Dyslexia Association), BDA (British Dyslexia Association), IBE (Instytut Badań Edukacyjnych [Polish Educational Research Institute])

Table 1 presents a sequence of dyslexia screening procedures by country. The selection of countries used for this comparison has been motivated by the fact that the Polish diagnostic procedures as well as screening tests draw from research on the English language. The Polish dyslexia screening model reflects the British approach. The Polish screening procedures stress the predominant importance of diagnosis and its documentation. However, the stage of implementation is not fully developed. From the perspective of school teachers, the description of the student's strengths and weaknesses may not be fully functional. The re-occurring questions of subject teachers, as they raise them during teacher-training sessions, are: What do the descriptions in the dyslexia certificate mean to me as a math/ science/ language teacher? What should my teaching dos and don'ts be? The Polish dyslexia assessment procedure is solely functional (it identifies what is getting in the way of learning) but it is not descriptive (it does not provide information on what can be done for further learning). This approach is in opposition to a general screening trend which looks at "the identification and assessment of specific learning difficulties [as] of crucial importance, since a full assessment will facilitate the planning of appropriate interventions (Reid, 1998, p. 34).

As a rule in Poland, the official diagnosis for dyslexia is often administered at the end of Year 3 that is end of Key Stage 1 (Bogdanowicz, 2002, p. 71). The two main reasons for the avoidance of early certification confirming dyslexia appear to be: the potential concurrence of dyslexia symptoms with other factors (e.g. multilingualism, individual differences, educational background), and an awareness of the psychological consequence of labeling a child with dyslexia (Łodej, 2016). Bogdanowicz (2002) who is a proponent of early diagnosis of dyslexia states that the diagnosis should be done when a student begins reading instructions. The aim of

such a screening procedure should be to identify a lack of readiness for reading and writing or the risk of dyslexia if not to clearly identify dyslexia.

External and internal diagnosis of reading and writing difficulties

The diagnosis of dyslexia can result from a) an internal screening (at the class / school levels) or b) an external screening (outside the school in the dyslexia screening center). The importance of internal screening is subscribed in the British National Literacy Strategy which suggests that "classroom teachers now have the key role to play in identification and planning for dyslexic learners" (Reid, 2005, p. vi). The in-class diagnosis results from a teacher's on-going and dynamic observation of the student. Teachers' knowledge of their students comes from comparing them with other students or groups of students. It also allows to place a student's scholastic achievement on the continuum of averaged learning achievements and to trace their responsiveness to current educational provisions. This is referred to as a progress monitoring and represents a formative evaluation. Teachers use the collected data to determine if there is a need for a change in instructional procedures or didactic materials. This approach is known as Response-to-Intervention Model (RTI) (Fuchs & Fuchs, 2006; Fletcher & Vaughn, 2009). The RTI resulted from the dissatisfaction with the results that the IQ-achievement discrepancy model offered. At the time when the LD was legitimatized as a spectrum of special educational needs in 1975 the number of "LD in the general U.S. population skyrocketed from less than 2% in 1976–1977 to more than 6% in 1999–2000" (in Fuchs & Fuchs, 2006, p. 96). The IQ discrepancy has been criticized (Lyon, 1987) as it proved to be insufficient to determine reading and writing difficulties. The practice showed that it allowed states and school districts to specify discrepancy differently. Therefore, the number of students with reading and writing difficulties varied greatly between schools and districts.

The external screening and diagnostics procedure which is used in Poland is based on the IQ-achievement discrepancy model in which a set of standardized tests is applied and then computed to determine if a student has a learning disability and needs special education services. This model is based on the concept of the normal curve. The student individual score on the IQ test is validated against their achievement on academic testing. If the difference or discrepancy is of at least 2.0 S.D the student is identified as having LD. The IQ-achievement discrepancy model also considered traditional has been of major use in Poland, since the diagnostic procedures are assigned to the Psychological-Pedagogical Centers. A student who has been observed to have reading and writing problems can be referred to a center for official diagnosis. The referral can be requested by a student's parent/guardian or by a school. As the next step the student is administered to the screening center where he undergoes both the IQ test and academic achievement tests. It is to be observed that the language of testing is Polish which is the students' L1, whereas post-test recommendations refer to language skills or abilities in general that is to the languages studied by the student.

As observed by Stuebing et al. (2009) IQ accounts for only 1% of the unique variance in response to reading intervention. In the same line, Fletcher et al. (1994)

point to the fact that if IQ and achievement correlate at 0.58, a 1.5 standard error discrepancy would call for the achievement to be lower by 32 points than IQ. Fletcher et al. (1994) follow this up by stating that it is impossible to determine whether any student is disabled solely on the basis of their IQ level. Similarly, the IQ referencing has been observed not to differentiate between the two groups of students, that being the 'bright student' and LDs on phonological processing even though the standard deviation of their IQ levels differed (Hoskyn & Swanson, 2000; Stuebing et al., 2002 in Fletcher & Vaughn, 2009).

Identifing dyslexia in a bilingual context

As observed by Peer and Reid (2000, p. 2) "teachers and psychologists have tended to misdiagnose or ignore dyslexia especially by multilingual students because of the multiplicity of factors that seem to be causes for failure". The level of complexity escalates if we diagnose for reading and writing problems in a student who uses two or more languages that belong to different language categories. In this linguistic context, additional factors such as: distance between languages, orthographic transparency, level of proficiency, language specific reading strategies add as barriers to accurate identification of a LD student. This requires tools and diagnostic competence that transcend the area of expertise shared by psychologists and pedagogues who diagnose for dyslexia. As dyslexia is a language problem, it is striking that in the Polish system no linguists are involved in the diagnostic procedures. It could be expected that it is the linguist who is trained in understanding the nature of the language and observe linguistics regularities and irregularities to a greater depth than a psychologist. The consequence of this monopoly is seen in the recommendations to further didactic work in which one can read that: a) weak areas that are identified in student's L1 translate to the same weaknesses in student's L2, b) difficulties in reading in a transparent L1 translate to difficulties in reading in a non-transparent L2, and that c) dyslexia in L1 allows for learning only one foreign language if there are two or more obligatory languages required by the school (Bogdanowicz & Sayles, 2004).

A framework for screening for dyslexia in a multilingual context was proposed by Smythe and Everatt (2000, p. 14). This model (see Fig. 1) is derived from the research on reading, witting, and spelling in different language systems.

Phonological processing includes testing the ability of blending and segmenting a word at the level of phoneme, syllable, and rhyme/onset. Auditory system testing includes discrimination of sounds and their perception, as well as sequential memory and auditory short-term memory. The visual system is tested with reference to visual discrimination and perception, sequential memory, and visual short-term memory. Semantic processing validates the semantic lexicon in relation to the speed of processing of lexical items. The rationale behind constructing this model derives from the reported problems of dyslexic learners of different orthographies. The model takes into account the transparency dimension between sound and symbol in opaque languages like English. "It also caters for the obstacles that learners of transparent orthographies, like Hungarian or Polish, encounter in writing, and

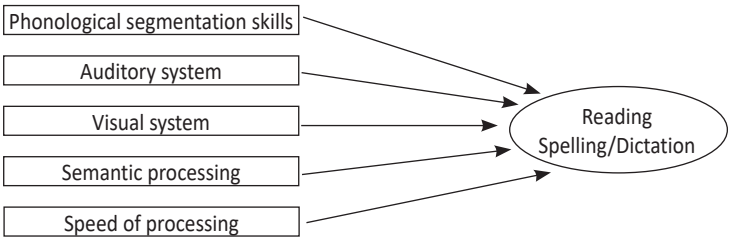


Figure 1. Framework for testing dyslexia (adopted from Smythe & Everatt, 2000, p. 14)

which are the result of the visual complexity (the number of diacritic markers) of the language" (Łodej, 2016, p. 10).

Purpose of the study

Dyslexic readers are observed to experience difficulties in learning a foreign language. In alphabetic languages the deficits are attributed largely to deficient phonological awareness (Geva, Yaghoub-Zadeh & Schuster, 2000) which is likely to be involved in the process of the transfer of language skills from L1 to L2 (Cummins, 1984; Sparks et al., 2009). On the other hand, linguistic typological differences constitute the platform for asymmetrical distribution of deficits across language systems (Wydell & Butterworth, 1999; Wydell & Kondo, 2003; Raman & Weekes, 2005; Mishra & Stainthrop, 2007). Therefore, it is important to identify how accurately and to what extent these language specific differences can be screened for in bilingual learners. The present study is a first step in a comprehensive research on asymmetrical transfer of language difficulties in students of two languages.

Method

This study aims at researching reading skills at three levels: reading comprehension, reading rate and reading accuracy in order to validate the reliability of IQ-achievement discrepancy testing in diagnosing dyslexia in speakers of two languages. In relation to reading comprehension and reading rate the data was collected for Polish and English. However, reading accuracy was computed for the English language only. It was motivated by the fact that the same accuracy tests could not be applied to a transparent L1 and a non-transparent L2. The multi-level dimension of the study contributed to the final format, which was designed and executed accordingly:

1. Student level: Z-score descriptions of 20 case studies of students who formed the dyslexia (RD) group and 20 case studies of students who formed the non-dyslexia (NRD)
2. Group level: Descriptive statistics and Pearson's Correlation Coefficient analyses of the dyslexia (RD) and the non-dyslexia (NRD) groups
3. Total population level: descriptive statistics, student's t-test and MANOVA analyses of the total population of the students researched
4. A priori testing of the total population

In an effort to measure reading comprehension, each student read three Polish stories and then three English stories. After reading each text, its gapped summary was given to the student for completion. Students could not refer to the text after having read them. Students were encouraged to ask the meaning of any words that they did not understand, both in the text and in the summary, and they were provided with a translation in Polish when required. They were allowed to provide answers in their first language as well. Reading rate was calculated with the number of words read out loud in one minute. To measure reading accuracy, there were four sets of real words presented to the students to read out loud. Two features of real words were manipulated for regularity and frequency, therefore there were four experimental conditions: high-frequency regular words HFR (e.g. *get*, *dark, did*), high-frequency exception words HFE (e.g. *walk, are, break*), low-frequency regular LFR (e.g. *slam, choose, soon*), and low-frequency exception words LFE (e.g. *sightseeing, said, broad*).

Participants

This study analyzed informants of Polish L1 and English L2. There were 40 subjects in the study with the ratio of boys to girls 18:22. They were Year 6 primary school students, in their 7th year of regular reading instructions in Polish and the 6th year of regular instruction in English. Their mother tongue was Polish while English was their foreign language, so their language competence in L1 and L2 differed substantially. The cohorts were 13-year-olds when the data was collected. Their estimated level of English was between A1 and A2 according to the *Common European Framework of Reference for Languages (2001).*

The group comprised of 20 students officially diagnosed with dyslexia (RD) and holding an appropriate certificate and 20 students without diagnosed learning problems called non-dyslexic readers (NRD), who form the non-dyslexia control group. The cohorts came from four primary schools. Dyslexic informants were randomly chosen by school counselors from groups holding dyslexia certificates. All certificates were issued by authorized dyslexia centers. The informants from the non-dyslexia group were chosen randomly from the classes of the dyslexic informants. The assumption was made that students not holding a dyslexia certificate in Year 6 are free from specific learning deficits. This presupposition was based on the fact that six years of Polish instruction would have revealed learning deficits if they existed. Additionally, even students who are reluctant to be diagnosed undergo diagnostic procedures before the end of Year 6 as there is a national aptitude test at the end of the Year 6 (end of Key Stage 2). A valid certificate classifying dyslexia entitles students to special treatment during the examination such as extended time for tasks, and exceptions on grading for orthography.

Data Analysis and Results

An a posteriori probability method treats the state of nature as random even after initial categorization is made prior to the research. These new probabilities conditioned upon the result of the experiment are called a posteriori probabilities (Chernoff & Moses, 1959, p. 174). An a posteriori test was used to ensure that the

students in both dyslexia and non-dyslexia groups were allocated accurately. This additional measure was introduced to determine which students should form the final RD and NRD research groups. The a posteriori probability test (computed in Statistica) revealed that case studies number 6, 7, 13, 14, 17 ($p \leq 0.5$) from the dyslexia group and case studies numbers 3, 10, 16, 17, 18 ($p \leq 0.5$) from the non-dyslexia group did not belong to the model. Table 2 shows the a posteriori probability for 20 case studies of students with diagnosed dyslexia. The case studies which did not belong to this model are marked with an asterisk. Interestingly, it shows that five cases of students with a binding dyslexia certificate out of twenty were inaccurately classified as dyslexic, which accounts for 25% of all the dyslexic students who participated in the research. Table 3 shows the a posteriori probability for 20 case studies of students from the non-dyslexia (NRD) group. Similar to the dyslexia group, five cases out of twenty were inaccurately classified as non-dyslexic, which accounts for 25% of all the non-dyslexic students who participated in the research.

Table 2. A posteriori probability (p = 0.5) for 20 case studies of students with dyslexia

Case study number	p = 0.5
1	0.979
2	0.729
3	0.862
4	0.946
5	0.681
* 6	0.262
* 7	0.500
8	0.777
9	0.850
10	0.635
11	0.697
12	0.869
* 13	0.134
* 14	0.308
15	0.671
16	0.722
* 17	0.176
18	0.872
19	0.879
20	0.560

The test results indicate that these five cases marked with an asterisk ($p \leq 0.5$) do not belong to the model, although no further conclusions as to proper classification can be made. At this point it is either possible that the rejected cases from the dyslexia group belong to the non-dyslexia population due to over diagnosis, or that they represent cognitive deficits other than dyslexia. Similarly, it seems

plausible that the rejected cases from the non-dyslexia group belong to the dyslexia group and represent under diagnosed cases.

Table 3. A posteriori probability (p = 0.5) for 20 case studies of students without dyslexia

Case study number	p = 0.5
1	0.775
2	0.544
* 3	0.347
4	0.774
5	0.621
6	0.837
7	0.818
8	0.791
9	0.946
* 10	0.338
11	0.846
12	0.837
13	0.801
14	0.557
15	0.903
* 16	0.496
* 17	0.246
* 18	0.291
19	0.538
20	0.932

The test results indicate that these five cases marked with an asterisk ($p \leq 0.5$) do not belong to the model, although no further conclusions as to proper classification can be made. At this point it is either possible that the rejected cases from the dyslexia group belong to the non-dyslexia population due to over diagnosis, or that they represent cognitive deficits other than dyslexia. Similarly, it seems plausible that the rejected cases from the non-dyslexia group belong to the dyslexia group and represent under diagnosed cases.

Discussion

The purpose of this study was to determine whether the results obtained from the IQ-achievement discrepancy tests have a potential to screen for reading difficulties in all languages students learn. In other words, do the results that are collected on a student's L1 translate to their L2 context. The findings reveal that the use of IQ-achievement discrepancy testing in diagnosing dyslexia in bilingual learners holds a limited reliability. This observation seems to apply to both language

contexts that is student's L1 and L2. The findings also show that 25 per cent of both dyslexic and non dyslexic students have been miss diagnosed. This high percentage might be attributed to the insufficient testing for language specific processing skills that are characteristic of reading in transparent (L1) and opaque (L2) scripts. Currently, there is no other statistical data available on the accuracy of dyslexia screening and diagnostic tests and their applicability to a bilingual setting in Poland.

The above observations on the limited reliability of testing for dyslexia are in keeping with the report by the National Examination Board (Centralna Komisja Egzaminacyjna, 2016) which reveals an unbalanced number of dyslexia certificates issued in various voivodships. Table 4. gives the number of students with diagnosed dyslexia who took the National Competence test at the end of a primary school between 2011–2016. There is a striking dissonance observed in the number of dyslexic students between selected voivodships. e.g wielkopolskie (9.8%) and pomorskie (18.5%) which fails to be justified by the population rate of wielkopolskie 3.475.323 and pomorskie 2.307.710 (Główny Urząd Statystyczny [Statistics Poland], 2018).

Table 4. The percentage of students with diagnosed dyslexia taking the National Competence Test in years 2010–2016 (after National Examination Board, 2016, p. 109)

Voivodship	Per cent of SLD (dyslexic) students		Percent of change in number identified as SLD 2006–2011
	2010–2011	2015–2016	
dolnośląskie	8.1%	12,0%	+ 3,9%
mazowieckie	13,4%	18,0%	+4,6%
opolskie	6,2%	10,5%	+ 4,3%
pomorskie	15,8%	18,5%	+2,7%
warmińsko-mazurskie	10,9%	15,4%	+4,5%
wielkopolskie	6,4%	9,8%	+3,4%

The high number of cases of dyslexia diagnosed in the Pomorskie and Mazowieckie voivodships could in part be explained by the fact that Gdańsk is the headquarters of the Polish Dyslexia Association, which annually organizes seminars, courses and conferences for dyslexia specialists and teachers whereas the Warszawa region is a center for education and educational reforms. The difference between voivodships in the number of students who are entitled to accommodations (range 9,8%–18,5%) supports the conclusion that the IQ-achievement discrepancy test has a limiting capacity to provide reliable results on difficulties in a student's reading and writing skills.

A fluctuating number of students identified as SLD between states has also been reported by the American National Center for Learning Disabilities (2014). Table 5 presents state-by-state change in LD identification rates in years 2006–2011.

Correspondingly, the results show that the percent of change in the number of students identified as SLD has been fluctuating over time and between states. For

example, in Mississippi the number of students identified with SLD in 2012 is 45.1% lower than in 2006. Whereas in Colorado the number is 9.9% higher over the same period of time. In addition, the population rate also fails to explain for the difference in numbers. The population of Utah is of 2.995.919 while the number of SLD students shows the value of 30.407 while in the equally dense state of Mississippi (2.992.333) the number of SLD students is 15.205 which is half the number (State population density, 2018). These numbers add to the discussion on the reliability of dyslexia screening procedures and the consequence this might yield in an educational setting.

Table 5. State-by-State Change in LD Identification Rates, 2006–2011 (adapted from: National Center for Learning Disabilities, 2014, p. 43)

State	Number of SLD students		Percent of change in number identified as SLD 2006–2011
	2006–2007	2011–2012	
Alabama	40.509	33.618	-17.0%
California	303.042	277.827	-8.3%
Colorado	29.996	32.981	+ 9.9%
Mississippi	27.704	15.205	-45.1%
Utah	27.601	30.407	+10.2%
Wyoming	4.686	4.382	-6.5%

Implications

The results of this study may be significant for dyslexia screening centers, dyslexia specialists, EFL classroom teachers, and most importantly for dyslexic learners struggling to learn English as a foreign language. It is important to ascertain to what extent existing diagnostic tests and procedures provide reliable and valid results on reading difficulties in a student of English as a FL. In other words, whether the Polish working model of LD diagnosis that is based on IQ-achievement discrepancy can serve as an accurate identification of reading problems in a bilingual Polish/English reader. By doing so, those responsible for providing appropriate interventions and constructing national screening, diagnostic and aptitude tests could make a rational judgment on both formal recommendations, format and grading specifications suitable for dyslexic learners of English as L2.

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